

Effectiveness of MemJog™ for People with Parkinson's Disease

Summary Report

Although Parkinson's Disease (PD) is classified as a movement disorder, people with PD also suffer from a variety of cognitive deficits. Verbal fluency is one such deficit of intense research focus (Henry & Crawford, 2004). Verbal fluency can be thought of as the ability to readily express oneself through speech (Lezak, 1995). Cognitively, this requires a person to recall and produce a target word from memory. Therefore, a deficit in verbal fluency is often observed as a word finding difficulty and has been compared to the 'tip-of-the-tongue' (TOT) phenomenon (Matison, Mayeux, Tosen, & Fahn, 1982).

This report details a study conducted to evaluate MemJog™ as a strategy for improving verbal fluency in people with PD. A brief overview of PD will be provided, followed by the most likely theoretical interpretations of the verbal fluency deficit in people with PD. An examination of MemJog™ as a strategy will then be reviewed, along with the aims of the study. A brief description of the methods used and results obtained will then be provided, followed by a discussion of the strengths and weaknesses of MemJog™ as a strategy for improving verbal fluency in people with PD.

Parkinson's Disease

PD is a progressive, neurologically based movement disorder often with cognitive and psychological malfunctioning (Pearce, 1992). Motor malfunctioning is characterised by:

1. Resting Tremor: A tremor that occurs when the body is at rest. This may involve multiple body parts or may be isolated to a limb for example.
2. Rigidity
3. Bradykinesia: Slowness of movement
4. Postural Instability

Other physical signs include aches and pains, drooling, incontinence, constipation, sleep disturbances, gait impairment, breathing problems, eye problems and freezing. Cognitive malfunctioning includes dementia in 20 to 60 per cent of cases of PD and deficits in thinking speed, speech and language, attention, memory and executive functions. Psychological malfunctioning includes depression, anxiety disorders and apathy. Recently, compulsive gambling behaviours have also been reported in cases of PD.

PD is thought to affect less than 1% in all people, but 1-2% in those beyond the age of 70.

Young-onset PD (presentation of symptoms between ages 21-39) is rare, existing in only 5%

of reported PD cases. Whilst PD typically manifests around the age of 50, noticeable symptomatology may not appear for some time; in some patients it may take 10 to 15 years. Unfortunately, one particular cause of PD is yet to be pinpointed, although some risk factors have been identified:

- Genetic risk
- Features of rural life (e.g., exposure to pesticides)
- Exposure to solvents in industrial work

Verbal Fluency

As stated previously, verbal fluency is the ability to cognitively produce a word from memory and can be likened to the TOT phenomenon. To types of tests are generally used to assess verbal fluency:

1. Phonemic fluency tests: participants are asked to recall words beginning with a letter of the alphabet (e.g. 'F').
2. Semantic fluency tests: participants are asked to recall words from within a category (e.g., types of animals).

Note. See "The Study" for further detail of these tests.

By statistically analysing the results of multiple studies, Henry and Crawford (2004) determined that on average, people with PD perform worse on these tests than healthy adults. Many theoretical interpretations have been presented to account for this deficit, including:

- Deficits in verbal fluency are secondary to motor deficits; that is, language production takes longer due to the slowness of muscle movement.
- People with PD are unable to organise or plan retrieval strategies to be able to perform the task to their full potential
- The amount of attention that people with PD can allocate to the tests is impaired.
- People with PD can not retrieve words because their memory for the word has deteriorated (i.e., similarly to Alzheimer's disease).
- The amount of information that people with PD can mentally manipulate at one time is impaired.
- People with PD have trouble accessing their 'mental dictionary'.

Generally, cognitive explanations are the most accepted in the literature, but no one explanation seems to account for the deficit in verbal fluency fully. It appears the most likely

explanations surround the retrieval process. Attention does not seem to hinder this process, and the actual memory for a word is not affected (although this may not be the case where the person also suffers from dementia).

MemJog™ As a Retrieval Strategy

MemJog™ is a visual memory tool design to help recall 'forgotten' words. It was developed on the premise of generated potential words by increasing the phonological information available to the person trying to recall a specific target. Three alphabets are sequentially manipulated to generate this information, therefore working as a phonological cue. The aid is visual in nature, allowing the user to concentrate on retrieval more easily than other strategies. It does so by driving search behaviour and decreasing the amount of mental manipulation normally required to plan and execute retrieval strategies.

I believe MemJog™ could offer an appropriate strategy for PD patients as:

- MemJog™ enables the user to concentrate more effectively by decreasing the amount of mental effort required to retrieve a word
- The use of phonemic cueing has previously improved PD patient's performance on similar task
- The aid is visual in nature, therefore cues are of an external type, which is preferred by PD patients due to their inability to guide internal behaviour.
- MemJog™ is portable and can be used individually, meaning the aid would be of practical use outside the laboratory.
- MemJog™ is inexpensive to purchase and little if any training is required (users are provided with an instruction card).
- MemJog™ is suitable for all ages and requires no technical ability to manipulate (although people in the more severe stages of PD could potentially have difficulties manipulating the tool due to the presence of motor symptoms).

The Study

Aims

This study aimed to determine whether MemJog™ is an effective strategy for improving verbal fluency in people with PD.

Study Design

Group 1 (Control):	$X \rightarrow Y_1$
Group 2 (Experimental):	$X \rightarrow Y_2$

X: Test 1

Y₁: Test 2 (Participants not given MemJog™ to use)

Y₂: Test 2 (Participants given MemJog™ to use)

Participants

Participants were people diagnosed with PD independently of this study. All participants were native speakers of English and (apart from one participant) were taking at least one type of PD medication at time of testing. Table 1 provides descriptive statistics for the sample used.

Table 1

Descriptive Statistics

	Experimental Group	Control Group
Number of participants	7 Males and 12 Females	16 Males and 5 Females
Age range (years)	52 – 83	56 – 85
Mean age (years)	68.42	71.19
Mean time period since diagnosis (years)	5.89	8.29

Tasks

As stated previously, there are two types of verbal fluency tests. This study used the category naming or semantic fluency type. Category naming tasks require participants to name as many exemplars within a superordinate category as possible under time constraints (usually one minute). However, in this study, no time constraint was used given extra time would be needed to manipulate MemJog™.

Here, two categories were used: furniture and vegetables. Examples of furniture include: chair, table, and couch. Examples of vegetables include: peas, carrots, and onions. The number of words named (excluding mistakes and repetitions) were summed to obtain a score. Instructions to participants were as follows:

I will say a category. Then I want you to give me as many words as you can think of from within that category as quickly as you can. For example, if I say 'sport', you might

give me 'football', 'basketball' or 'tennis'. Do you have any questions? Begin when I give you the category. The category is _____ (furniture/vegetable).

This task has been found to test verbal fluency reasonably consistently and accurately in other studies of a similar nature. Practice effects (i.e., the effect that a participant will get better over the course of testing due to practice rather than any intervention effect) have been recorded but are not inevitable.

Procedure

Pilot tested was initially conducted on healthy adults to refine procedural conditions.

Observations made during this testing resulted in the elimination of time constraints, the formulation of more succinct instructions than those read verbatim from the instruction card and the future use of audio-recording of responses.

PD participants were randomly assigned to the control of experimental group (by coin toss) as recruitment occurred. Testing took place individually in a quiet room at the participant's residence. After gathering demographic information, all participants were administered the first category naming task using the instructions stated previously. Responses were timed and audio-recorded. If needed, the category, and (or) the basic instructions were repeated. Basic instructions were also repeated as a prompt if participants named several words associated with the category that were not considered exemplars (e.g., 'colour' and 'comfort' for the category 'furniture'). When the participant indicated that they were finished, I asked them "is that as many words as you can name?" before concluding the task. A 10 minute break followed this task to minimise fatigue.

Experimental participants were then introduced to MemJog™ and were given instructions on use. Although effort was made to standardise instructions, they varied slightly depending on how well the initial instructions were understood. The second category naming task was then administered to all participants. Experimental participants completed the task using MemJog™ while control participants completed the task unaided. Total duration of testing session was approximately 30 to 40 minutes.

Results

Participants who used MemJog™ on the second task were able to increase their score by six more words on average (compared to the first task). This represents a statistically significant difference from the control group who were only able to increase their score by two more

words on average. Therefore, it appears MemJog™ may offer a meaningful strategy for improving verbal fluency for people with PD. This result is depicted in figure 1.

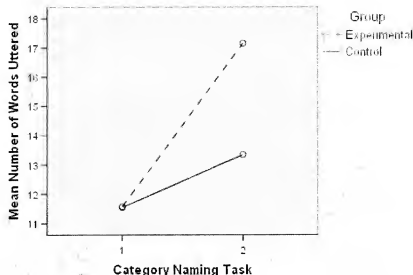


Figure 1. Effect of MemJog™ use on mean number of words uttered on category naming tasks.

However, participants who used MemJog™ took significantly more time to complete the second task than those who completed the task unaided. Indeed, the average time taken to complete the second task when using MemJog™ was 6 min. Whereas, the average time taken to complete the second task without MemJog™ was approximately 1.5 min. Therefore it appears that adopting MemJog™ as a retrieval strategy is particularly time consuming. This result is depicted in figure 2.

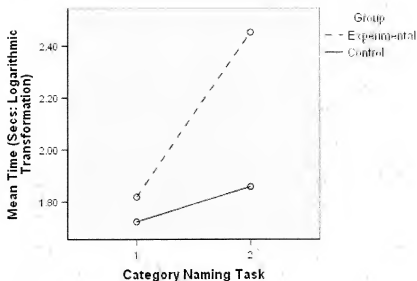


Figure 2. Effect of MemJog™ use on time taken on category naming tasks.

MemJog™ Evaluation

An evaluation of the tool's strengths and limitations will now be presented. These should be considered when an individual is judging whether MemJog™ will be beneficial for them as an individual. They may also be used as a guide for future modifications or marketing strategies.

Strengths:

1. The use of MemJog™ limits the use of processes such as organisation, self-monitoring and inhibition. This factor successfully facilitated the retrieval process in the sample tested here. For example, one participant commented that she is unable to use the same sort of alphabet process mentally as she quickly forgets what letter of the alphabet she is up to. By using MemJog™ she no longer had to simultaneously monitor her response. Having a letter centred in the view box reminded her of her place in the alphabet. This allowed her to concentrate more effectively on retrieving targets.
2. The external nature of the phonemic cues (i.e., visual presentation) on MemJog™ allowed PD participants in this study to follow a strategy rather than create their own.

This seemed to eliminate organisational and planning aspects of the retrieval process and again allow them to focus more effort on finding targets. This was further facilitated by the fact the sequence of cues (i.e., the alphabet) was familiar.

3. Several participants noted that MemJog™ provided them with ‘order’ that gave structure and regulation to their response preventing them from giving up on the task earlier.
4. Few problems were observed with PD patients trying to physically manipulate the tool. Many patients did not display any motor symptoms due to the use of medication or due to their type of symptom. Those participants that did display motor symptoms when manipulating the tool, however, reported that they were used to doing things when they were ‘shaky’. Therefore, the level of technical ability does not appear to limit use in this population.

Limitations:

1. A small minority of participants reported that they went ‘blank’ when they had to focus on the letters of the tool. In these cases participants noted that the increased level of concentration for them as an individual hindered their ability to retrieve more words. Freezing has been noted as a physiological symptom of PD, so it is possible that these events are a reflection of this symptom in the cognitive domain. However, it is unclear whether employing the tool was not a successful strategy because of their present symptoms or whether it actually induced freezing in these participants.
2. MemJog™ is a time consuming strategy to employ. Apart from results of this study in relation to time, participant observations also made this point clear. Many seemed unenthusiastic about employing such a lengthy process. One participant noted he would rather wait and let the word come to him in time. Indeed, the time taken to use MemJog™ must be weighed against the likelihood of the word being recall in this time anyway. Therefore, the use of MemJog™ as retrieval strategy will be effected by a person’s willingness to invest time in using
3. Given MemJog™ is a time consuming strategy, this may limit its use in certain contexts. For example, it may not be viable to use during the course of conversation if the person has to interrupt the conversation for a period of time. In this instance it may be more feasible to rely on copying strategies such as using associated words or other members of the conversation for help.

4. The novelty of MemJog™ as a strategy to recall ‘forgotten’ words may increase the mental effort required in the retrieval process. Although the strategy of phonemic cueing is not a new concept in Psychology, it represented a new technique to a proportion of participants in this study. For these participants, additional mental effort may have been required to process a ‘new’ strategy. Indeed, some of these participants did not understand how a letter could help them produce a target.